

AMENDMENTS TO THE DRAWINGS

The attached "Replacement Sheets" of drawings includes changes to Figures 2, 4a, and 4b. The attached "Replacement Sheets" replace the last amended sheets showing Figure2, as well as the sheets for Figures 4a and 4b.

Attachments: Replacement Sheet for Fig. 2;
 Replacement Sheet for Fig. 4a;
 Replacement Sheet for Fig. 4b.

REMARKS

Claims 1-4 and 6-24 are now pending in the application. Minor amendments have been made to the claims to simply overcome the objections to the specification and rejections of the claims under 35 U.S.C. § 112. Independent claims 1 and 10 are amended. Claims 21-24 are added. Support for the amendments and additions may be found in the Drawings and Specification as originally filed at Figures 4a and 5 and related discussion at p. 16, l. 18 – p. 22, l. 2. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

OBJECTIONS TO THE DRAWINGS

Figures 2, 4a, and 4b are amended as suggested by the Examiner. It should be noted, however, that one skilled in the art may wish to refer to the originally filed figures 2 and 4a for the following reasons. Firstly, the originally filed Figure 2 illustrates that the preferred data structure differs from the formal definition of a tree in that siblings are linked to one another, with only the first, leftmost child being linked to its parent. This structure is functionally equivalent to a formally defined tree when combined with an appropriate traversal procedure, and, in the context of the present invention, facilitates the traversal of the siblings. Secondly, the originally filed Figure 4a illustrates a word graph that differs from the formal definition of a tree in that a node may have multiple parents. This word graph is useful for conceptually demonstrating use of the claimed invention with a continuous speech recognition data structure. Again, combined with an appropriate traversal procedure, this graph data structure is functionally equivalent to a formally defined tree data structure. Accordingly, Applicants respectfully submit that the

tree data structure recited in the claims need not precisely meet the definition of a tree in structural terms, but rather be functionally equivalent to a tree data structure in the context of its accompanying traversal procedure. Specifically, the claimed tree data structure can be any linked, traversable, hierarchical data structure.

Accordingly, Applicants respectfully request the Examiner withdraw the objections to the drawings.

REJECTION UNDER 35 U.S.C. § 112

Claims 1 and 10 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed.

The Examiner remarks that the recitation of both a traversal using a forward recursion and a backward traversal of the active nodes is in conflict. Applicants have amended claims 1 and 10 to remove the language relating to the traversal using the forward recursion.

Accordingly, Applicants respectfully request the Examiner reconsider and withdraw the rejection of claims 1 and 10 under 35 U.S.C. § 112, second paragraph,

Claims 1 and 10 stand rejected under 35 U.S.C. § 112, as failing to comply with the enablement requirement.

The Examiner remarks that the recitation of both a traversal using a forward recursion and a backward traversal of the active nodes is in conflict. Applicants have amended claims 1 and 10 to remove the language relating to the traversal using the forward recursion.

Accordingly, Applicants respectfully request the Examiner reconsider and withdraw the rejection of claims 1 and 10 under 35 U.S.C. § 112, first paragraph.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 3 and 6-16 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kao (U.S. Pat. No. 6,374,222) in view of Mitchell et al. (U.S. Pat. No. 6,574,595). This rejection is respectfully traversed.

Kao is generally directed toward a method of memory management in speech recognition. In particular, the Examiner relies on Kao to teach propagation of an active nodes envelope in a lexical search tree. However, the Examiner admits (p. 7, lines 15-18) that Kao does not teach traversing active nodes by processing the deepest child generation first. Moreover, Kao does not teach traversing the active nodes envelope in a backwards direction, from the deepest child generation of the active nodes envelope toward the root of the envelope, while assigning probability scores to nodes based on knowledge of their respective child nodes, in order to propagate the active nodes envelope in the tree data structure.

Mitchell et al. is generally directed toward recognition-based barge-in detection in the context of subword based automatic speech recognition. In particular, the Examiner relies on Mitchell et al. to teach traversing active nodes by processing the deepest child generation first in the form of a backward traversal of a lattice constructed by a forward traversal of a lexical tree data structure. However, Mitchell et al. does not teach traversing the active nodes envelope in a backwards direction, from the deepest child generation of the active nodes envelope toward the root of the envelope, while assigning probability scores to nodes based on knowledge of their respective child

nodes, in order to propagate the active nodes envelope in the tree data structure. For further discussion of the teachings of Mitchell et al., Applicants respectfully direct the Examiner's attention to the Declaration and Exhibit filed concurrently herewith under 35 U.S.C. § 1.132.

Applicants' claimed invention is generally directed toward an improvement in a dynamic programming system. In particular, Applicants claimed invention is directed toward traversing an active nodes envelope in a backwards direction, from the deepest child generation of the active nodes envelope toward the root of the envelope, while assigning probability scores to nodes based on knowledge of their respective child nodes, in order to propagate the active nodes envelope in the tree data structure. For example, independent claim 1, as amended, recites, "a traversal algorithm implemented by said processor, said algorithm traversing an active nodes envelope made up of a subset of said nodes based on a set of traversal rules whereby nodes of a given generation of said active nodes envelope are processed before any parent nodes of said given generation are processed, a deepest child generation of said active nodes envelope is processed first, and traversal among nodes of each generation of said active nodes envelope proceeds in the same topological direction, wherein said traversal algorithm includes a dynamic programming process that assigns probability scores to nodes based on knowledge of their respective child nodes in order to propagate the active nodes envelope in said tree data structure." Also, independent claim 10, as amended, recites, "said active nodes have a probability score above a pre-determined search threshold, said probability score being determined from information sourced only from the child generation nodes; and a traversal algorithm ... traversing

said nodes based on a set of traversal rules whereby only said active nodes that are determined as having a probability score above the pre-determined search threshold are traversed, wherein said traversal algorithm includes a dynamic programming process that traverses said active nodes envelope in a backwards direction, from the deepest child generation of said active nodes envelope toward the root of said active nodes envelope, and assigns probability scores to nodes in order to propagate the active nodes envelope in the tree data structure.” Accordingly, neither Kao nor Mitchell et al. teach all of the limitations of the independent claims.

These differences are significant because the backwards traversal to assign the probabilities and thereby propagate the active nodes envelope is much faster than prior art techniques for propagating an active nodes envelope in a tree data structure. For further discussion of the differences between the prior art and Applicants’ claimed invention, Applicants respectfully direct the Examiner’s attention to the Declaration and Exhibit filed concurrently herewith under 35 U.S.C. § 1.132.

Accordingly, Applicants respectfully request the Examiner reconsider and withdraw the rejection of independent claims 1 and 10, along with rejection of all claims dependent therefrom.

Claims 2, 4, 17, and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kao (U.S. Pat. No. 6,374,222) in view of Mitchell et al.(U.S. Pat. No. 6,574,595) and further “in view of well known art” (MPEP 2144.03). This rejection is respectfully traversed.

Firstly, Applicants assume that the Examiner also intended to reject claim 20 on the same grounds as claim 19. Accordingly, the following traversal is also directed at rejection of claim 20.

Secondly, the rejection based on “well known prior art” is hereby challenged.

Thirdly, Applicants note that claims 2, 4, 17, 19, and 20 are each dependent on base claims that are allowable for reasons detailed above with respect to rejection of claims 1, 3 and 6-16 and 18.

Accordingly, Applicants respectfully request the Examiner reconsider and withdraw the rejection of claims 2, 4, 17, and 19 under 35 U.S.C. § 103(a).

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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